Topic: Dividing radicals

Question: Simplify the expression.

$$\sqrt{\frac{6}{23}} \cdot \frac{\sqrt{23}}{\sqrt{23}}$$

Answer choices:

A $\frac{\sqrt{111}}{2}$

B $\frac{\sqrt{23}}{118}$

C $\frac{\sqrt{138}}{23}$

D $\frac{23}{6}$

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Solution: C

When we have the square root of a fraction, we want to rewrite it as the quotient of the square roots of the numbers in the numerator and denominator.

$$\sqrt{\frac{6}{23}} \cdot \frac{\sqrt{23}}{\sqrt{23}}$$

$$\frac{\sqrt{6}}{\sqrt{23}} \cdot \frac{\sqrt{23}}{\sqrt{23}}$$

Then, as usual, we multiply the two fractions by multiplying the numerators separately from the denominators.

$$\frac{\sqrt{6}\sqrt{23}}{\sqrt{23}\sqrt{23}}$$

$\sqrt{23}$ multiplied by itself will give us just 23 in the denominator.

$$\frac{\sqrt{6}\sqrt{23}}{23}$$

To get the product of square roots in the numerator, $\sqrt{6}\sqrt{23}$, we can rewrite it as the square root of the product of the radicands (as $\sqrt{6 \cdot 23}$).

$$\frac{\sqrt{6 \cdot 23}}{23}$$

$$\frac{\sqrt{138}}{23}$$

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Topic: Dividing radicals

Question: Rationalize the denominator.

$$\frac{4+\sqrt{5}}{\sqrt{3}}$$

Answer choices:

A $\dfrac{\sqrt{3}+\sqrt{5}}{3}$

B $4\sqrt{3}+3\sqrt{5}$

C $\dfrac{\sqrt{3}}{4+\sqrt{5}}$

D $\dfrac{4\sqrt{3}+\sqrt{15}}{3}$

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Solution: D

To rationalize the denominator, we'll multiply both the numerator and denominator by $\sqrt{3}$.

$$\frac{4+\sqrt{5}}{\sqrt{3}}$$

$$\frac{\left(4+\sqrt{5}\right)\sqrt{3}}{\sqrt{3}\sqrt{3}}$$

$$\frac{4\sqrt{3}+\sqrt{5}\sqrt{3}}{\sqrt{3}\sqrt{3}}$$

$\sqrt{3}$ multiplied by itself will give us just 3 in the denominator.

$$\frac{4\sqrt{3}+\sqrt{5}\sqrt{3}}{3}$$

We can rewrite the product of square roots in the second term in the numerator, $\sqrt{5}\sqrt{3}$, as the square root of the product of the radicands (as $\sqrt{5}\sqrt{3}$), which can be simplified to $\sqrt{15}$.

$$\frac{4\sqrt{3}+\sqrt{15}}{3}$$

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Topic: Dividing radicals

Question: Simplify the expression.

$$\frac{\sqrt{27}}{\sqrt{3}}$$

Answer choices:

A 3

B 9

C $\sqrt{9}$

D 27

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Solution: A

When you have a fraction in which the numerator is a root and the denominator is a root, you can put the fraction under one root instead.

$$\frac{\sqrt{27}}{\sqrt{3}}$$

$$\sqrt{\frac{27}{3}}$$

Then, since $27/3 = 9$, we get

$$\sqrt{9}$$

$$3$$

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